NASA/GSFC	MISSION OPERATIONS & DATA SYSTEMS DIRECTORATE (MO&DSD) CONFIGURATION CHANGE REQUEST (CCR)			
1. CCR NO.	CCR-530-ICD-07	**2. DATE** August 19, 1997	**3. PRIORITY** ☐ EMERGENCY ☐ URGENT ■ ROUTINE	**4. CHANGE LEVEL** ☐ A ☐ B ☐ C ■ D ☐ E ☐ F

5. TITLE OF CHANGE

OPM-67 Updates

6. DOCUMENT TITLE ICD Between the NCC/FDF and the WSC

DOCUMENT NO. 530-ICD-NCC-FDF/WSC, Revision 5, 1 June 1997

LIST ALL AFFECTED DOCUMENTS INCLUDING PROCEDURES

ICD Between the NCC/FDF and the WSC for the TDRS H, I, J Era,
405-TDRS-RP-ICD-001

(CONT ON ATTACHMENT)

7. REASON FOR CHANGE

Provide necessary information to the FDF facilitating increased TDRS orbit determination accuracy and correct miscellaneous errors.

(CONT ON ATTACHMENT)

8. DESCRIPTION OF CHANGE

Pages 2-1, 9-62, 9-63, 9-64

(CONT ON ATTACHMENT)

9. IMPACT

YES	NO		YES	NO		YES	NO	
■	☐	SCHEDULE	☐	■	RELIABILITY/MAINTAINABILITY/SAFETY	■	☐	GROUND SEGMENT
■	☐	BUDGET				☐	■	SPACE SEGMENT
☐	■	FACILITIES	☐	■	USER SERVICES/MANUALS	☐	■	LOGISTICS
☐	■	TESTING	☐	■	RISK MANAGEMENT	■	☐	DOCUMENTATION
☐	■	TRAINING	☐	■	SECURITY	☐	■	HARDWARE
☐	■	SPECIFICATIONS	☐	■	USAF FUNDING REQ'D	■	☐	SOFTWARE
■	☐	CONTRACTOR SUPPORT	☐	■	POWER	☐	■	OTHER
■	☐	INTERFACES	☐	■	WEIGHT			

SYSTEM

ORGANIZATIONAL

YES	NO		YES	NO		YES	NO		YES	NO	
☐	■	501	■	☐	530	☐	■	MSFC	☐	■	CODE E
☐	■	502	☐	■	540	☐	■	JSC	☐	■	CODE S
☐	■	503	■	☐	550	☐	■	LERC	☐	■	CODE T
☐	■	510	☐	■	560	☐	■	KSC	☐	■	OTHER
☐	■	520	■	☐	OTHER	☐	■	JPL			
			Code 405								

10. COMMENTS

	SIGNATURE	DATE
STel ANALYST		
HARDWARE ENGINEER		
OPERATIONS REPRESENTATIVE		
SYSTEMS ENGINEER		
I AND T MANAGER		

CONCURRENCE:

CODE 285

DATE

11. BOARD ACTION

☐ APPROVED ☐ WITHDRAWN
☐ DISAPPROVED ☐ DEFERRED UNTIL _____

12. DIRECTION/ACTION REQUIRED

☐ ECP ☐ TECH DIRECTION ☐ CONTRACT MOD
☐ WAIVER ☐ PUBLISH DOCUMENT ☐ PUBLISH DCN
☐ DEVIATION ☐ C.O. LETTER ☐ OTHER _____

13. ORIGINATOR B. Gioannini 505-527-7002 **CODE** 530.1

SIGNATURE _____ **DATE** _____

14. SEGMENT MANAGER'S APPROVAL **CODE** _____

SIGNATURE _____ **DATE** _____

15. CCB APPROVAL

SIGNATURE _____ **DATE** _____

16. CCR IMPLEMENTED

ATR SIGNATURE _____ **DATE** _____

CCB SIGNATURE _____ **DATE** _____

Section 2. Interface Definition and Ground Rules

The messages exchanged between the WSC and the NCC/FDF are generated in the Space to Ground Link Terminal's (SGLT's) at each ground terminal and in the NCC/FDF at the GSFC. The interface between the Danzante and Cacique SGLTs and the NCC is provided by the Data Interface System (DIS), and the interface between the GRGT SGLT and the NCC is via the Cacique DIS. The messages interchanged between the SGLT's and the DIS are shown in Figure 2-1. The protocol and descriptions of the messages between the NCC/FDF and WSC are contained in this ICD.

2.1 Interfaces

The SGLT's interface with the DIS is via the Black Data Switch. The DIS interface to the NCC is via the DIS Security Equipment. All messages described in the following sections are exchanged via these interfaces. The DIS provides the acknowledge/retransmit protocol between the SGLT and the NCC/FDF.

2.1.1 NCC to WSC Messages

NCC to WSC messages, consisting of scheduling order messages (SHO's) and operations messages (OPM's), shall be transmitted by the DIS to the SGLT's.

2.1.2 WSC to NCC/FDF Messages

WSC to NCC messages, consisting of operations messages (OPM's), TDRSS Service Level Reports (SLR's), and operations data messages (ODM's) shall be transmitted from the SGLT's to the NCC via the DIS. WSC to FDF messages consist of Tracking Data messages (TDM's) and OPM-Class 67 messages, and are also transmitted from the SGLT's and relayed to the FDF via the DIS. Acknowledgment shall be requested of all OPM and SLR messages sent from WSC to the NCC, except as described below. If there is no message pending transmission to WSC, then the NCC will send a separate OPM (Acknowledgment of Message Received) to WSC. A separate OPM (Acknowledgment of Message Received) shall be used if there is no other message pending transmission to the NCC. WSC will not solicit acknowledgment of the Acknowledgment of Message Received OPM. The DIS Automatic Data Processing Equipment (ADPE) shall provide the acknowledge/retransmit protocol for the WSC.

The originator shall transmit all blocks of a message before initiating the transmission of another message except for separate acknowledgement messages which shall be transmitted, as required, at the next block transmission opportunity.

No acknowledge/retransmit of tracking data messages (TDM's), OPM-Class 67 messages, and operations data messages (ODM's) is required. Section 12 describes these tracking data, format and content. Section 9.5 describes the ODM's.

9.3.4.14 Stationkeeping/Momentum Dump Data, OPM - Class 67

The format and transmission requirements of this section are applicable to TDRS F1-F7 only. TDRS H, I, J requirements for OPM-Class 67 are TBS. ~~This message shall be manually generated and sent at least one hour prior to the first thruster action for stationkeeping maneuvers or at least 30 minutes prior to the first thruster action for momentum dump maneuvers. The message shall start in Byte 23 of the 4800 bit block. Bytes 19 through 22 shall contain zeros.~~ This message shall be sent only to the FDF and the Special Projects and Missions~~LI~~ on the ~~LI~~ TDM lines.

This message shall be manually generated and sent at least one hour prior to burn start time for stationkeeping maneuvers and at least 30 minutes prior to the first thruster action for momentum dump maneuvers. In the event that a stationkeeping maneuver is cancelled after sending the OPM-Class 67, an additional OPM-Class 67 shall be sent with identical values with the exception that the predicted delta velocity components shall be zero. In the event that a momentum dump is cancelled after sending the OPM-Class 67, an additional OPM-Class 67 shall be sent with identical values with the exception that the predicted momentum wheel delta RPM sum and difference shall be zero.

The message shall start in Byte 23 of the 4800 bit block. Bytes 19 through 22 shall contain zeros. The message structure is:

# of Bytes	Data Item
2	Message Type 03
	Message Date/Time:
2	Year
3	Day
2	Hour
2	Minute
1	Message Source 0 = Danzante 1 = Cacique/GRGT
2	Message Class 67
4	TDRS SIC (1300-1399)
1	Activity 0 = Stationkeeping 1 = Momentum Dump

# of Bytes	Data Item	
	Planned Start Time	Stationkeeping:
3	Day	Accurate to within
2	Hour	± 1 second
2	Minute	Momentum Dump:
2	Second	Accurate to within
		± 10 minutes
	Planned Stop Time	Stationkeeping:
3	Day	Accurate to within
2	Hour	± 1 second
2	Minute	Momentum Dump:
2	Second	Accurate to within
		± 10 minutes

Stationkeeping Information (Zeros if momentum dump)

# of Bytes	Data Item		
	Predicted Thruster Configuration		
4	1) ID #1	(+/-,A-Z,0-9,A-Z)	
4	2) ID #2	(+/-,A-Z,0-9,A-Z)	
4	3) Spare	(Zeros)	
4	4) Spare	(Zeros)	
	Predicted Delta Velocity (ft./sec.)		Accurate to ± 5%
8	1) Body R	(+/-00.0000 to +/-99.9999)	
8	2) Body I	(+/-00.0000 to +/-99.9999)	
8	3) Body C	(+/-00.0000 to +/-99.9999)	

Momentum Dump Information (Zeros if stationkeeping)

# of Bytes	Data Item		
1	Dump Type		
	0 = roll/yaw		
	1 = pitch		
	Predicted Thruster Configuration		
4	1) ID #1	(+/-,A-Z,0-9,A-Z)	
4	2) ID #2	(+/-,A-Z,0-9,A-Z)	All zeros for pitch momentum unloads
4	3) Spare (Zeros)		
4	4) Spare (Zeros)		

# of Bytes	Data Item		
2	Predicted Pulse Count (~~00-99~~pitch) or		Value 00-99
	Predicted Pulse Pairs (roll/yaw)		Accurate to ± 2
	Predicted Start Momentum (ft-lb-sec~~Newtons/sec~~^{2})		Accurate to ± 20%
5	1) Hx	(± 0.00 to ± 1.00)	Local TDRS Body
5	2) Hy	(± 0.00 ~~to ± 1.00~~)	Coordinate System
5	3) Hz	(± 0.00 to ± 1.00)	
	Predicted Stop Momentum (ft-lb-sec~~Newtons/sec~~^{2})		Accurate to ± 20%
5	1) Hx	(± 0.00 to ± 1.00)	
5	2) Hy	(± 0.00 ~~to ± 1.00~~)	
5	3) Hz	(± 0.00 to ± 1.00)	
	Predicted Momentum Wheel		Accurate to ± 20%
7	1) Delta RPM Sum	(± 000.00 to ± 999.00)	
7	2) Delta RPM Difference	(± 000.00 to ± 999.00)	
140			

9.4 Message Subfield for SLR's (Service Level Status Report)

The WSC service level status information shall be sent from the WSC to the NCC in the form of service level status report (SLR's) as changes in equipment status occur or as requested verbally by the NCC. The service level status information for GRGT will be provided within Cacique SLRs in the SGLT 3 Service Chains and the End-to-End 3 Ground Antenna data items. The GRGT 11-m ground antenna service level status information will be provided using an OPM-54.

9.4.1 SLR Header

The SLR provides the service availability of each WSC ground terminal to the NCC for user service scheduling. SLR's shall be sent to the NCC (1) upon verbal request from the NCC, (2) upon change in any reported parameter within 15 minutes of the change.